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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,874	11/27/2002	Chia-Tien Peng	9788-US-PA	5275

31561 7590 03/18/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER	
FULLER, ERIC B	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 03/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/065,874	PENG, CHIA-TIEN	
	Examiner	Art Unit	
	Eric B Fuller	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-16 and 18-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-16 and 18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5, 7-14, 16, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Havemann et al. (US 5,747,880), and further in view of Campion et al. (US 6,201,917 B1).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon

layer having more uniform grain diameters (column 4, lines 55-53; abstract). The insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

However, Havemann teaches that porous silicon oxide has a lower thermal conductivity than solid silicon oxide. Porous silicon oxide obviously qualifies as "silicon oxide or the like", as taught by Kanaya. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize porous silicon oxide as an insulating layer. By doing so, the uniformity of the grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

As the thermal conductivity of porous silicon oxide is less than solid silicon oxide, it inherently must be within the applicant's claimed range.

The applicant's admitted prior art, in view of Kanaya and Havemann, fails to teach aluminum oxide being included in the porous layer. However, it is taught by Havemann that porous silicon oxide has less mechanical strength than solid silicon oxide and there exists a need to strengthen the porous silicon oxide (column 2, lines 50-

55). Campion teaches increasing the strength of silicon oxide by doping it with aluminum oxide in the range of 100 ppm to 1000 ppm. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to dope the porous silicon oxide layer with aluminum oxide in the amount taught. By doing so, the mechanical strength of the porous silicon oxide is increased.

As to claims 21 and 22, Kanaya teaches the thickness of the insulating layer is within the applicant's range. To use a thickness within the applicant's range would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success, as Kanaya teaches similar ranges as being useful in the art.

Claims 4 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Havemann et al. (US 5,747,880), as applied to claims 1 and 10 above, and further in view of Haven et al. (US 6,380,670).

The applicant's admitted prior art in view of Kanaya and Havemann teach the limitations of claims 1 and 10, as shown above. The combined references are silent to teach the deposition method of the porous silicon oxide layer. However, Haven teaches that porous silicon oxide may be deposited by e-beam evaporation. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to deposited the porous silicon oxide by e-beam evaporation. By doing so, one would have a reasonable expectation of success, as the combined references

teach to deposit the porous silicon oxide and Haven teaches a method by which this may be done.

Claims 1-3, 5, 7-14, 16, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Numata (US 5,519,250), and further in view of Campion et al. (US 6,201,917 B1).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon layer having more uniform grain diameters (column 4, lines 55-53; abstract). The insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the

uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

However, Numata teaches that silica aerogel, a sol-gel derived silicon oxide, is very porous and has negligible thermal conductivity. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize silica aerogel in the above mentioned process. By doing so, the uniformity of the grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

The applicant's admitted prior art, in view of Kanaya and Numata, fail to teach aluminum oxide being included in the porous layer. However, Campion teaches increasing the strength of silicon oxide by doping it with aluminum oxide in the range of 100 ppm to 1000 ppm. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to dope the porous silicon oxide layer with aluminum oxide in the amount taught. By doing so, the mechanical strength of the porous silicon oxide is increased.

As to claims 21 and 22, Kanaya teaches the thickness of the insulating layer is within the applicant's range. To use a thickness within the applicant's range would have been obvious at the time the invention was made to a person having ordinary skill in the

art with a reasonable expectation of success, as Kanaya teaches similar ranges as being useful in the art.

Response to Arguments

Applicant has added the limitations of claim 6 and 17 into amended claims 1 and 10, respectively. Applicant argues that the references used to reject claims 1 and 10 in the previous office action fail to teach the claims as they have now been amended. Examiner agrees and has withdrawn the rejections to these claims accordingly. The applicant's arguments are moot in view of the new grounds of rejection.

As to the limitation that has been the added to claims 1 and 10, the applicant argues that the references fail to teach alloying the porous silicon oxide layer with aluminum oxide. Applicant argues that Campion, as it was previously applied to claims 6 and 17, teaches to alloy solid silica rather than porous and that one of ordinary skill in the art would only dope solid silica, but not porous. This argument is not found convincing. Kanaya in view of Havemann or Numata all ready teach a porous silica layer. Havemann teaches that porous silica has low mechanical strength. Campion teaches that alloying with alumina may increase the strength of silica. Although the particular application of Campion may be for solid silica, one of ordinary skill in the art, being charged with the knowledge of an engineer, would recognize that alloying silica with alumina would strengthen the silica regardless of the silica being porous or solid. As Havemann teaches that porous silica has less strength than solid silica, more motivation exists to dope the silica taught by Havemann. Kanaya in view of Havemann

or Numata all ready teach the benefits of using a porous layer. Campion does not provide any motivation to reverse these teachings by using a solid layer, as the applicant seems to suggest. Campion only provides motivation for alloying the layer with alumina, as alumina has the property of increasing mechanical strength of silica. This property exists regardless of the silica being porous or solid.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck, can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EBF

MICHAEL BARR
PRIMARY EXAMINER